



## Avian Life History Information for Focus Bird Species Using the Northern Gulf of Mexico

Draft Final | April 29, 2014

prepared for:

Kate Healy and Brian Spears

The Department of the Interior, U.S. Fish and  
Wildlife Service

prepared by:

Nadia Martin, James Dwyer, Jessica Murray, and  
Nicholas Tyack

Industrial Economics, Incorporated

2067 Massachusetts Avenue

Cambridge, MA 02140

## AVIAN LIFE HISTORY INFORMATION FOR FOCUS BIRD SPECIES USING THE NORTHERN GULF OF MEXICO

### INTRODUCTION

This report presents life history information for bird species that use the northern Gulf of Mexico. Species included in this report were identified by the Natural Resource Damage Assessment (NRDA) Trustees for the Deepwater Horizon/Mississippi Canyon 252 oil spill as having been affected by the release of oil and/or the response to the spill.<sup>1</sup> Part I of this report presents information for the Brown pelican (*Pelecanus occidentalis*), clapper rail (*Rallus longirostris*), great blue heron (*Ardea herodias*), laughing gull (*Leucophaeus atricilla*), mallard (*Anas platyrhynchos*), northern gannet (*Morus bassanus*), and seaside sparrow (*Ammodramus maritimus*); while Part II presents information on the American oystercatcher (*Haematopus palliatus*), American white pelican (*Pelecanus erythrorhynchos*), common loon (*Gavia immer*), double-crested cormorant (*Phalacrocorax auritus*), great shearwater (*Puffinus gravis*), pied-billed grebe (*Podilymbus podiceps*), and sanderling (*Calidris alba*).<sup>2</sup> The avian life history parameters selected for purposes of this report may be useful for the Deepwater Horizon Natural Resource Damage Assessment and Restoration being conducted by the Trustees under the Oil Pollution Act, 33 U.S.C. §§2701-2762 and its implementing regulations, 15 C.F.R. § 990.

Table 1 identifies select life history parameters that are provided in this report, along with definitions for these parameters.

### METHODOLOGY

IEC reviewed life history parameter information compiled by the Department of the Interior and conducted literature searches to gather readily available information for the species included in Parts I and II of this document. Based on this compilation and review, recommended values are provided for each species and life history parameter, presented in Tables I and II. The appendices within Part I and Part II provide species-specific details in support of the recommendations and the assumptions made when species-specific or Gulf of Mexico-specific data were unavailable.

Sources cited in this report include peer-reviewed journal articles, a well-established online avian encyclopedia administered by the Cornell Lab of Ornithology and the American Ornithologists' Union, U.S. Fish and Wildlife Service information, previous NRDA case information, academic theses and dissertations, and personal communications. These sources are believed to be credible and, as such, sources' data collection methods and analyses were not evaluated. The extent of life history information available for each species and parameter varies. In some cases, only one data

---

<sup>1</sup> Other species of birds may also have been affected by the spill, including those affected by response actions taken during the spill. This report is not intended to be an exhaustive list of birds impacted by the *Deepwater Horizon* oil spill.

<sup>2</sup> All species in Part I and Part II are included as birds protected by the Migratory Bird Treaty Act.

value was available, and in these cases, this value was chosen as the recommended value for the relevant life history parameter. In other cases, multiple studies were available for a given species or related species, resulting in a number of different estimates for a particular life history parameter. For instance, we reference 11 sources that included estimates of Brown pelican (*Pelecanus occidentalis*) fledglings per breeding pair per year which provided a range from 0.3 to 2. For these cases, the following procedures were followed to select among (or to combine) the available values, taking into account the relevance of results from studies conducted along the Gulf of Mexico coast.

1. When a data value was available from a study conducted on a species' Gulf of Mexico coast population, it was used as the recommended value. If more than one data source was available for Gulf of Mexico populations, the mean of the Gulf of Mexico values from those sources was used as the recommended value. Data values on Gulf of Mexico populations are defined as those collected from studies on populations inhabiting or breeding within Gulf of Mexico states (Texas, Louisiana, Mississippi, Alabama, and/or the western coast of Florida). If the specific location within a Gulf State was not specified, the data value was assumed to be applicable to all Gulf of Mexico populations.
2. If no data value were available from a study conducted on a species' Gulf of Mexico population, the mean of all available data values was used as the recommended value (i.e., values are not evaluated or prioritized for sample size, design of the underlying study, or any other factors).
3. If no data were available for the specific species in question, the mean of all available data values for closely related species was used as the recommended value.<sup>3</sup> Specific cases where related species' data were used are indicated in the appendices of Part I and Part II of this report.
4. In the case of survival rates (fledgling, juvenile, and adult), when age-specific information was available for a given species (e.g., common loon survival rate for ages 1 to 2 is 55.5 percent, 2 to 3 is 60.5 percent, and 3+ is 91 percent), this detailed information is provided in the appendices tables, and the range of values is presented in the summary tables (tables I and II). When the information available was more general and presented as a "juvenile" or "adult" survival rate (without specific ages identified), the mean of all available values is presented for the given category.

#### **ASSUMPTIONS AND UNCERTAINTIES**

There is some uncertainty associated with the recommended values presented for each species. This is partly due to the variation in values presented in the literature for a given life history parameter depending on the species, location of the population investigated, and nature of the study, and various assumptions made when data were limited or unavailable (Table 1).

---

<sup>3</sup> For laughing gull, pied-billed grebe, great shearwater, and sanderling, species-specific information was not available for some parameters and information on related species was used. In the case of laughing gull, information from species in related genera in the Laridae family was used; for pied-billed grebe, information for species in related genera in the Podicipedidae family was used; for great shearwater, information for species from the same genus was used (*Puffinus sp.*); and for sanderling, information for species from the same genus was used (*Calidris sp.*). See appendices in Part I and Part II of this report for details.

A brief discussion of the assumptions made related to specific parameters is provided below. Additional assumptions are identified in the “Reference” column of the species-specific tables presented in the Appendices.

- *Number of fledglings per breeding pair per year.* When information specifically related to the number of fledglings per breeding pair was unavailable, this parameter was calculated by multiplying available information on fledgling success by mean clutch size. Additionally, some of the species addressed in this report may have more than one clutch per year. This is common for pied-billed grebes, for example, and is therefore taken into account in the recommended value for this parameter for pied-billed grebes. For other species that may double clutch, such as the clapper rail, seaside sparrow and double-crested cormorant, insufficient information is available to determine the likelihood and percentage of double clutches, and therefore this report assumes these species have only one clutch per year.
- *Percentage of adult females breeding each year.* When information was unavailable, a 100 percent assumption is used, which maximizes the number of breeding pairs.
- *Percentage of females in a population.* For each of the species included within this document, when an adult sex ratio (ASR) was identified, that specific ASR was provided. When assumptions or statements regarding an estimated ASR were available, these references are included in the individual species appendix. Frequently for a given species, no specific data was available. There have been efforts to identify the expected ASR for bird species generally. However, noting the potential biases and uncertainty in a potential blanket application of a general ratio to any single species (Donald 2007), we assume a 1:1 male:female ratio when no species-specific information was available based on a basic binomial probability of producing either a female or male chick.

Additionally, some bird species populations contain individuals that are capable of breeding, but that do not reproduce. These non-reproducing birds may take advantage of nesting opportunities if one of the individuals from an existing breeding pair is lost. We did not find evidence of this phenomenon in the literature for the seven species presented in Part I of this report or for six of the seven species in Part II. Adult common loon (Part II) individuals may exhibit this behavior.

TABLE 1. DEFINITIONS OF SELECT LIFE HISTORY PARAMETERS

LIFE HISTORY/ DEMOGRAPHIC PARAMETER	DEFINITION	ASSUMPTIONS <sup>4</sup>
# FLEDGLINGS PER BREEDING PAIR PER YEAR	Number of fledglings produced per pair of adults each year	When specific information on fledglings per pair per year is unknown, number of fledglings is calculated by multiplying fledgling success rate by mean clutch size
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	Mean percentage of fledglings that survive to 1 year of age (mean value displayed unless otherwise noted).	None
JUVENILE ANNUAL SURVIVAL RATE	Mean annual survival rate of juvenile birds; juvenile is defined as between 1 year and age at first breeding. Where age at first breeding is 1 year, juvenile survival rate is equal to fledge survival rate.	None
AGE AT FIRST BREEDING	Mean age at which bird species begins to breed (age in years at which a “juvenile” becomes an “adult”).	None
ADULT ANNUAL SURVIVAL RATE	Mean annual survival rate of adult birds; where age of adulthood is unspecified, the adult stage is defined as beginning at the age of sexual maturity.	None
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	Estimated percentage of adult female population that breeds each year.	Where percentage unknown, assume 100% <sup>5</sup>
% FEMALES IN THE POPULATION	Percentage of adult population that is female.	Where percentage unknown, assume 50% <sup>6</sup>
AVERAGE LIFESPAN	Average expected lifespan of an individual bird, in years.	When average lifespan was not reported in the readily available literature, the average lifespan is calculated using the following formula: [age at first breeding + (1/ln(adult survival rate))]

<sup>4</sup> Species-specific assumptions made for all parameters noted in the appendices.

<sup>5</sup> This estimate maximizes the number of females breeding each year.

<sup>6</sup> Based on the 50% probability of producing a female chick.

**PART I**

This section provides recommended values for each of the identified life history parameters (Table I) for the species listed below.

- Brown pelican
- Clapper rail
- Great blue heron
- Laughing gull<sup>7</sup>
- Mallard
- Northern gannet
- Seaside sparrow

As noted above, species-specific details in support of the recommended values for each life history parameter are provided in the tables in the Appendices (Appendices I-A through I-G). The column titled “Recommended Value” provides the recommended value for a given life history parameter, and states whether that value is based on data on Gulf of Mexico population(s) of the relevant species or a mean of available information. The “Details” column provides additional information on the life history parameter or on the derivation of a value based on related life history parameter values (i.e., in the case that a certain parameter value was not specified in the literature, it may sometimes be derived from other parameter values applicable to the species). The “Reference” column provides the citation for the relevant reference and the study location by state or more specific location where available. Footnotes in each appendix table provide clarifying information on select reference values.

---

<sup>7</sup> In some cases, laughing gull-specific information was limited. Therefore, the information provided here is compiled from a number of related species within the family Laridae.

TABLE I. RECOMMENDED VALUES FOR SELECT LIFE HISTORY PARAMETERS

LIFE HISTORY/ DEMOGRAPHIC PARAMETER <sup>1</sup>	SPECIES						
	BROWN PELICAN	CLAPPER RAIL	GREAT BLUE HERON	LAUGHING GULL	MALLARD	NORTHERN GANNET	SEASIDE SPARROW
# FLEDGLINGS PER BREEDING PAIR PER YEAR	1.44	5.5	0.35	0.97	2.27	0.75	0.58
FLEDGE SURVIVAL RATES (0 TO 1 YEAR OLD)	30%	39.3%	31%	60%	39.8%	35%	10.4%
JUVENILE ANNUAL SURVIVAL RATE (AGES)	64% (1-3)	39.3% (0-1)	63.7% (1-2)	75% (1-3)	39.8% (0-1)	94% (1-5)	10.4% (0-1)
AGE AT FIRST BREEDING	3	1	2	3	1	5	1
ADULT ANNUAL SURVIVAL RATE (AGES)	82% (3-10)	51.7% (1-3)	78.1% (2-6)	82% (3-8)	60.8% (1-2)	94% (5-16)	76.4% (1-8.5)
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	95%	100%	100%	100%	100%	100%	100%
% FEMALES IN THE POPULATION	50%	50%	50%	50%	41.3%	50%	50%
AVERAGE LIFESPAN (YEARS)	10	3	6	8	2	16	8.5
<sup>1</sup> Some of these values represent the mean of information from various literature sources, whereas others are specific values from a single source. Additional details on the derivation of each value presented in this table are included in the appendices to Part I of this document (Appendices I-A through I-G).							

APPENDIX I-A: BROWN PELICAN (*Pelecanus occidentalis*)

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	1.44 fledglings (mean of Gulf-specific values)	0.3 - 1.7 (1.0 mean productivity per nest)	Schreiber 1979 (as cited in Shields 2002, Table 1): Tarpon Key, FL (Gulf side)
		1.1	McNease et al. 1984: LA
		1.54 mean across sites (1.27 mean 1971-1990; 1.66 mean 1979-1990; 1.69 mean 1987-1990)	McNease et al. 1992; LA, 3 separate sites
		1.63	McNease 1998: LA
		1.78 (1971-2007), 1.95 (2007) (1.87 mean)	LDWF 2008: LA
		1.5	LDWF 2010: LA
		0.6 - 1.2 (0.9 mean fledglings per nest)	Shields 2002 (as cited in Shields 2002, Table 1): NC
		0.9 - 2.1 (1.5 mean)	Collazo 1985 (as cited in Shields 2002, Table 1): Puerto Rico, Montalva Bay
		0.7 - 1.8 (1.25 mean)	Collazo 1985 (as cited in Shields 2002, Table 1): Puerto Rico, Conejo Cay
		0.3 - 1.2 ( 0.75 mean fledglings per nest)	F. Gress pers. com. (as cited in Shields 2002, Table 1): CA
		0.1 - 0.85 (0.475 mean fledglings per breeding attempt)	USFWS 2007: various locations
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	30% (Gulf-specific value)	64% <sup>1</sup>	Anderson et al. 1996: CA
		30% (survival of first 12 months from nestling or hatching year)	Schreiber and Mock 1988: banded birds in N. and S. Carolina, and FL, Henny 1972: FL
JUVENILE ANNUAL SURVIVAL RATE (AGES 1 TO 3)	64% (Gulf-specific value)	64%	Henny 1972 (as cited in Schreiber and Mock 1988): FL
		72% <sup>1</sup>	Anderson et al. 1996: CA
AGE AT FIRST BREEDING	3	3 years <sup>1</sup>	Williams and Joanen 1974: LA, FL
		1 - 2 years (bred at this age with lower success)	McNease et al. 1984: LA; Blus and Keahey 1978: SC; USFWS 1983: CA
		3 - 5 years (typical age)	USFWS 2012: species profile, various locations; Schreiber et al. 1989: CA, FL, SC, LA, and other locations
ADULT ANNUAL SURVIVAL RATE (AGES 3+)	82% (Gulf-specific value) <sup>2</sup>	82%	Henny 1972 (as cited in Schreiber and Mock 1988): FL
		88% <sup>1</sup> ((Anderson et al. 1982 found that 16 of 17 (94%) Brown pelicans from 2 studies	Anderson et al. 1996: CA

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
		survived 180 days; extrapolating to one year resulted in the 88% annual adult survival rate estimate)	
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	95%	95% <sup>1</sup>	Assumption used in Luckenbach 2006 and Kure 2008 NRDA cases: CA
% FEMALES IN THE POPULATION	50%	No information available on sex ratio	<i>Shields 2002: Assumption as previously described in Assumptions discussion above</i>
AVERAGE LIFESPAN (YEARS)	10	10 years <sup>3</sup> (effectively reproduce for 4 to 7 years post breeding age, i.e., post age 3)	Schreiber and Mock 1988: banded birds in NC, SC, and FL
<p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>1. Value used in Luckenbach and Kure NRDA cases (Luckenbach Trustee Council 2006, Kure/Humboldt Bay Trustee Council 2008).</li> <li>2. Schreiber and Mock (1988) suggest a 10+ age survival rate of approximately 2%; however, this value is excluded from the adult survival rate estimate since the effective reproductive years for Brown pelicans are 4 to 7 years post breeding age or up to 10 years of age (Schreiber and Mock 1988).</li> <li>3. The oldest observed banded bird was 43 years old (Schreiber and Mock 1988).</li> </ol>			

APPENDIX I-B: CLAPPER RAIL (*Rallus longirostris*)

INJURY, LIFE HISTORY OR DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	5.5 fledglings	5.5 (Calculated given mean daily nest success of 98.5%, typical incubation of 24d from Rush et al. 2007 and mean clutch of 7.84 eggs): AL tidal marshes Range: 4 - 7	Rush et al. 2010 (as cited in Rush et al. 2012): MS
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	39.3% (Gulf-specific value)	5.8:1 or 5:1. Ratio of immatures:adults in NC during fall (n=263) and fall-winter (n=35) seasons, respectively.	Adams and Quay 1958: NC
		3:1. Ratio of immatures:adults in VA during September of 1983 (n=80).	Meanley 1985: VA
		Parental care usually ends by week 5 or 6 post hatching and so it is assumed that there is no definable time period difference between when a bird fledges and becomes a juvenile. Rush et al. 2012 identifies a LA fall juvenile:adult ratio of 2:1 the equivalent of 4 juvenile birds per pair. Using 4 juvenile birds per pair and 5.5 fledglings per pair, an estimated fall juvenile survival is 72.7% ( $4 \div 5.5$ ). Applying the adult annual survival rate of 54% (to estimate survival through spring), fledgling and juvenile annual survival rate is estimated as 39.3% ( $0.727 \times 0.54$ ).	Sharp 1976 (as cited in Rush et al. 2012): LA
JUVENILE ANNUAL SURVIVAL RATE (AGES 0 TO 1; SAME AS ABOVE)	39.3%	Same as above because clapper rails reach sexual maturity at 1 year old, and survival rates above 1 year are captured in adult survival rate	Sharp 1976 (as cited in Rush et al. 2012): LA
AGE AT FIRST BREEDING	1	Unknown, assumed to be 1 year	Rush et al. 2012: location not specified
ADULT ANNUAL SURVIVAL RATE (AGES 1+)	51.7% (mean of all values)	49% - 67% (adults fitted with radio transmitters; composite annual survival rate for all yrs (1985-1987) was 26%, but effects of radio transmitters may have depressed survival)	Eddleman 1989: AZ
		45.4% (re-sighting banded adult birds)	Hoffman 2001: CA
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	Assumption
% FEMALES IN THE POPULATION	50% ( from LA specific information)	<i>Birds shot in LA did not differ from 1:1 sex ratio; AZ 2:1 males:females but trapping biased towards males ; NC 1955, 71:29 male:female, 1956 50:50 ; Brunswick GA 1999-2000, 18:11 male:female, 2006 12:18 male:female, 2007 10:7 male:female</i>	Sharp 1976: LA, Eddleman 1989: AZ, Adams and Quay 1958: NC, Gaines et al. in press: GA (as cited in Rush et al. 2012)
AVERAGE LIFESPAN (YEARS)	3	2.6 years <sup>1</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))])	Calculated from other parameter values
<i>Notes:</i>			
1. Oldest banded bird was 7 years and 6 months (Clapp et al. 1982).			

APPENDIX I-C: GREAT BLUE HERON (*Ardea herodias*)

INJURY, LIFE HISTORY OR DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.35 fledglings (Gulf-specific value)	2.4 (mean; 2.3 young/nest in northern and central IL, 2.5 in southern IL, 2-3 in northern WI, and 2.43 in OR)	INRIN 2003: IL, WI, OR
		0.5 - 2.7 (1.6 mean)	Pratt 1970: CA, Quinney 1983: NS, Canada, Vos et al. 1985: CO, Burkholder and Smith 1991: OH, Butler 1995: BC, Canada, Butler 1997: BC, Canada, Vennesland and Butler 2004: Canada, Witt 2006: VA, Kelly et al. 2007: CA, Baker and Sepulveda 2009: IN (as cited in Vennesland and Butler 2011), mean for Herodias group
		0.35 (mean for Occidentalis group, 2.5 fledglings per successful nesting attempt, excluding nests given supplementary feeding results in 1.46 fledglings; however 76% of all nesting attempts fail, taking this into account equates to 0.35 fledglings per nest [ $1.46 \times (1 - 0.76)$ ])	Powell and Powell 1986 (as cited in Vennesland and Butler 2011): FL Bay
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	31%	31% <sup>1</sup> (year 1, fledglings)	Henny 1972: United States and Canada; Butler 1992: BC and INRIN 2003: IL
JUVENILE ANNUAL SURVIVAL RATE (AGES 1 TO 2)	63.7%	63.7% (ages 1 to 2)	Henny 1972: United States and Canada
AGE AT FIRST BREEDING	2	2 years <sup>1</sup>	Butler 1992: BC and INRIN 2003: IL
ADULT ANNUAL SURVIVAL RATE (AGES 2+)	78.1%	78.1% <sup>1</sup> (ages 2+)	Henny 1972: United States and Canada, Butler 1992: BC and INRIN 2003: IL
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	<i>Assumption</i>
% FEMALES IN THE POPULATION	50% <sup>1</sup>	No information available	Vennesland and Butler 2011; <i>Assumption as previously described in Assumption discussion above</i> )
AVERAGE LIFESPAN (YEARS)	6	6.0 years <sup>2</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))])	Calculated from other parameter values.
<i>.Notes:</i>			
1. Value was used in the Lake Apopka NRDA.			
2. The oldest banded bird recovered was 23 years old (as cited in Butler 1992).			

## APPENDIX I-D: LAUGHING GULL (based on various related genera in the family Laridae)

INJURY, LIFE HISTORY OR DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.97 (mean of Gulf-specific values)	1.2 (mean) <sup>1</sup>   1.32 (3-egg clutches); 0.71 (2-egg clutches)	Schreiber et al. 1979 (as cited in Burger 1996, App. 2): FL
		1.07 mean; 1.2 (1979), 0.7 (1980), 1.3 (1981)	White et al. 1983 (as cited in Burger 1996, App. 2): Port Masfield, TX
		0.65 mean; 0.7 (1978), 0.5 (1979), 0 (1980), 1.4 (1981)	White et al. 1983 (as cited in Burger 1996, App. 2): Corpus Christie, TX
		0.16	Morris 1984 (as cited in Burger 1996, App. 2): Little Tobago Island, Trinidad
		1.21	Burger unpubl. data (as cited in Burger 1996, App. 2): Barnegat Bay, NJ
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	60% (mean of all values)	79% (ages 0 to 1)	Coulson and White 1959 (as cited in Hatch et al. 2009): UK, Black-legged Kittiwatke ( <i>Rissa tridactyla</i> )
		40% (ages 0 to 1)	Butler et al. 1980 (as cited in Hayward and Verbeek 2008): BC, Glaucous-winged Gull ( <i>Larus occidentalis</i> )
		61% (ages 0 to 1)	Reid 1988 (as cited in Hayward and Verbeek 2008): WA, Glaucous-winged Gull ( <i>Larus occidentalis</i> )
JUVENILE ANNUAL SURVIVAL RATE (AGES 1 TO 2)	75%	75% (ages 1 to 2)	CA DFG and USFWS 2008: CA, Western gull ( <i>Larus occidentalis</i> )
AGE AT FIRST BREEDING	3	3 years	Burger 1996: NJ
ADULT ANNUAL SURVIVAL RATE (AGES 2+)	82% (mean)	80 - 84% <sup>2</sup> (ages 2+)	CA DFG and USFWS 2008: CA, Western gull ( <i>Larus occidentalis</i> )
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	Assumption
% FEMALES IN THE POPULATION	50%	Assumed to be 1:1	Burger 1996
AVERAGE LIFESPAN (YEARS)	8	8 years <sup>3</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))])	Calculated from other parameter values
<p>Note that although laughing gull (<i>Leucophaeus atricilla</i>) is the focal species, the table above includes information from a number of related species because species-specific information was limited. Information presented in this table is from a study conducted on laughing gull, unless otherwise stated.</p> <p>Notes:</p> <ol style="list-style-type: none"> <li>1. Mean clutch size of 2.8 eggs; implies a ratio of 2-egg clutches to 3-egg clutches of 1:4. Therefore, approximately 80% of nests contain 3-egg clutches and 20% contain 2-egg clutches. Mean fledglings per breeding pair per year calculated as <math>[(1.32 \times 4) + (0.71 \times 1)] / 5</math>.</li> <li>2. Survival rate decreases to 50-78% over year 15 (CA DFG and USFWS 2008); however, this value is excluded from the adult survival rate estimate since the average lifespan is calculated as eight years.</li> <li>3. Maximum lifespan is 19 years (M. K. Klimkiewicz pers. com., location not specified, as cited in Burger 1996).</li> </ol>			

APPENDIX I-E: MALLARD (*Anas platyrhynchos*)

INJURY, LIFE HISTORY OR DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	2.27 fledglings (mean across all values)	2.49 (35% fledglings success, clutch size of 7.12) <sup>1</sup>	Talent et al. 1983 (as cited in Drilling et al. 2002): ND, Cowardin et al. 1985 (as cited in Drilling et al. 2002): ND
		2.42 - 2.63 (34-37% survival from hatching to 50d, clutch size of 7.12) <sup>1</sup>	Mauser et al. 1994 (as cited in Drilling et al. 2002): CA
		1.78 ( $\leq 75\%$ eggs do not survive to fledging, $\sim 25\%$ minimum fledgling success, clutch size of 7.12) <sup>1</sup>	Duebbert et al. 1983 (as cited in Drilling et al. 2002): ND
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	39.8% (mean)	25%	25% (0.86 survival rate post-fledgling to pre-hunting period and 0.29 from onset of hunting to migration, and 0.25 for both periods combined; monitored 48 females and 42 males during 1972-74)
		54.5% (mean)	46 - 61% female (53.5% mean), 48 - 63% (55.5% mean) male (stated as juvenile survival rate, age range assumed to be 0-1 yr)
JUVENILE ANNUAL SURVIVAL RATE (ASSUMED AGES 0 TO 1)	39.8% (mean)	Same as above.	Kirby and Sargeant 1999: MN Anderson 1975: IL, Arnold and Clark 1996: SK, Smith and Reynolds 1992: Central North America and Canada (as cited in Drilling et al. 2002)
AGE AT FIRST BREEDING	1	1 year	As cited in Drilling et al. 2002 (no original reference cited)
ADULT ANNUAL SURVIVAL RATE (AGES 1+)	60.8% (mean)	54 - 59% female (56.5% mean), 62 - 68% (65% mean) male (stated as adult survival rate, assumed to be $\geq 1$ yr due to age at first breeding)	Anderson 1975: IL, Arnold and Clark 1996: SK, Smith and Reynolds 1992: Central North America and Canada (as cited in Drilling et al. 2002)
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	<i>Assumption</i>
% OF FEMALES IN THE POPULATION	41.3%	41.3% (1.42 males per female in the population); During winter pairing, North America average 1.33 males/female	Munro and Kimball 1982: WI and New England: Rohwer and Anderson 1988 (as cited in Drilling et al. 2002): North America
AVERAGE LIFESPAN (YEARS)	2	1.8 years <sup>2</sup> (mean life expectancy of adults)	Anderson 1975 (as cited in Drilling et al. 2002): IL
Notes:			
1. Mean clutch size calculated by taking the mean of clutch size of 1-13 (Palmer 1976, Phersson 1991, Alisauskas and Ankney 1992) and clutch size of 8.72 (Dzubin and Gollop 1972).			
2. Oldest banded wild individual was 29 years 1 month old (Kennard 1975, as cited in Drilling et al. 2002).			

APPENDIX I-F: NORTHERN GANNET (*Morus bassanus*)

INJURY, LIFE HISTORY OR DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.75 fledglings (mean across all values)	0.72 - 0.75 (0.734 mean, 71.7% - 75.1% of young fledged from eggs laid, equates to 0.72 - 0.75 fledglings using clutch size of 1)	G.Chapdelaine and J.-F. Rail unpubl. (as cited in Mowbray 2002): Bonaventure Island, Canada
		77.7% (0.77 fledglings using clutch size of 1)	Nelson 1978a (as cited in Mowbray 2002): Bass Rock, Scotland
		0.72 - 0.86 (based on 0.8 egg to hatch success x 0.9 hatch to fledge success = 0.72 overall fledge rate. Hatching success can be as high as .95, which would increase fledge rates to 0.76; using clutch size of 1)	Montevecchi unpubl. data (as cited in Mowbray 2002): Newfoundland, Canada
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	35%	35% (age 0-1)	Nelson 1978 (as cited in Mowbray 2002): Bass Rock, Scotland
JUVENILE SURVIVAL RATE (AGES 1 TO 5)	94%	94% (age 1-5)	Nelson 1978 (as cited in Mowbray 2002): Bass Rock, Scotland
AGE AT FIRST BREEDING	5 (mean)	5 years (mean)	Nelson 1978a (as cited in Mowbray 2002): Bass Rock, Scotland: most males are 5-6 year old when first breed, female typically one year younger than male
ADULT ANNUAL SURVIVAL RATE (AGES 5+)	94%	94% (age ≥5 yr)	Nelson 1978a (as cited in Mowbray 2002): Bass Rock, Scotland (as cited in Chapdelaine et al. 1987)
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100% <sup>1</sup>	--	<i>Assumption</i>
% FEMALES IN THE POPULATION	50%	No information available	<i>Mowbray 2002: Assumption as previously described in Assumptions discussion above</i>
AVERAGE LIFESPAN (YEARS)	16	16.2 years <sup>2</sup> average life expectancy	As cited in Mowbray 2002 (no original reference cited)
<i>Notes:</i>			
1. Specific value not listed but text states that the proportion of females breeding each year is likely high (Mowbray 2002).			
2. Oldest reported individual in East North Atlantic was 21 years old (Nelson 1978a, Bass Rock; Mowbray 2002).			

APPENDIX I-G: SEASIDE SPARROW (*Ammodramus maritimus*)

INJURY, LIFE HISTORY OR DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.58 fledglings (Gulf-specific value)	0.58 (2-yr mean; range: 0.17-0.99)	Post et al. 1983: FL
		3.97 (2-yr mean)	Marshall and Reinert 1990: MA
		4.43 (4-yr mean)	Post and Greenlaw 1982: NY
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	10.4%	0-1: 10.4% ( <i>A. m. macgillivraii</i> minimum survival rate, n=85, 2000-2003 mark-recapture study, non-migratory population; minimum survival rate for hatch year to year 1)	As cited in Post and Greenlaw 2009 (no outside reference cited): SC
JUVENILE ANNUAL SURVIVAL RATE (AGES 0 TO 1; SAME AS ABOVE)	10.4%	Same as above, since seaside sparrows reach sexual maturity/adulthood at 1 year old	
AGE AT FIRST BREEDING	1	Spring after hatching year (-9 months old)	As cited in Post and Greenlaw 2009 (no outside reference cited)
ADULT ANNUAL SURVIVAL RATE (AGES 1+)	76.4% (mean of Gulf-specific values)	88% ( <i>A. m. mirabilis</i> , age range unspecified, assumed to be $\geq 1$ yr)	Werner 1975 (as cited in Post and Greenlaw 2009): Southern FL, Cape Sable
		66% ( <i>A. m. mirabilis</i> , non-migratory population; 63% - 69% survival; age range unspecified, assumed to be $\geq 1$ yr)	Dean and Morrison 1999 (as cited in Post and Greenlaw 2009): Southern FL, Cape Sable
		66% ( <i>A. m. mirabilis</i> , non-migratory population; 1994-98; age range unspecified, assumed to be $\geq 1$ yr)	Lockwood et al. 2001 (as cited in Post and Greenlaw 2009): Southern FL, Cape Sable
		85.7% male ( <i>A. m. peninsulae</i> , non-migratory population; min. adult male survival rate; age range unspecified, assumed to be $\geq 1$ yr)	Post et al. 1983 (as cited in Post and Greenlaw 2009): Northern FL
		Female - male rates: 52% - 72% (age 1-2); 18% - 58% (age 2-3); 38% - 53% (age 3-4); 14% - 32% (age 4-5) ( <i>A. m. macgillivraii</i> minimum survival rate, 2000-2003 mark-recapture study, non-migratory population. 154 male marked in 2000, 66 female marked in 2000)	As cited in Post and Greenlaw 2009 (no outside reference cited): SC
		52.9% (mean across female and male annual survival estimates; <i>A. m. maritimus</i> , migratory populations. Minimum adult survival through 1980, year classes: 1967-72: 60.4% female, 57% male; 1976-77: 41.4% female, 52.8% male. Age range unspecified, assumed $\geq 1$ yr)	Post and Greenlaw 1982 (as cited in Post and Greenlaw 2009): Atlantic coast

INJURY, LIFE HISTORY OR DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	<i>Assumption</i>
% FEMALES IN THE POPULATION	50%	Adult sex ratio about equal	Oak Beach, NY; WP: Post and Greenlaw 2009,
AVERAGE LIFESPAN (YEARS)	8.5 (mean)	8 - 9 years <sup>1</sup> (potential lifespan)	Sykes 1980, M.V. McDonald pers. com. (as cited in Post and Greenlaw 2009)
<i>Notes:</i> 1. Maximum lifespan unknown.			

## PART II

This section provides recommended values for each of the identified life history parameters (Table II) for the species listed below.

- American oystercatcher
- American white pelican
- Common loon
- Double-crested cormorant
- Great shearwater<sup>8</sup>
- Pied-billed grebe<sup>9</sup>
- Sanderling<sup>10</sup>

As noted above, species-specific details in support of the recommended values for each life history parameter are provided in the tables in the Appendices (Appendices II-A through II-G). The column titled “Recommended Value” provides the recommended value for a given life history parameter, and states whether that value is based on data on Gulf population(s) of the relevant species or a mean of available information. The “Details” column provides additional information on the life history parameter or on the derivation of a value based on related life history parameter values (i.e., in the case that a certain parameter value was not specified in the literature, it may sometimes be derived from other parameter values applicable to the species). The “Reference” column provides the citation for the relevant reference and the study location by state or more specific location where available. Footnotes in each appendix table provide clarifying information on select reference values.

---

<sup>8</sup> Great shearwater-specific information was limited. Therefore, information provided here is compiled from a number of related species in the genus *Puffinus*.

<sup>9</sup> Pied-billed grebe-specific information was limited. Therefore, information provided here is compiled from a number of related genera within the family Podicipedidae.

<sup>10</sup> Sanderling-specific information was limited. Therefore, some of the information provided here is compiled from related species in the genus *Calidris*.

TABLE II. RECOMMENDED VALUES FOR SELECT LIFE HISTORY PARAMETERS

LIFE HISTORY/ DEMOGRAPHIC PARAMETER <sup>1</sup>	SPECIES						
	AMERICAN OYSTER CATCHER	AMERICAN WHITE PELICAN	COMMON LOON	DOUBLE- CRESTED CORMORANT	GREAT SHEARWATER	PIED- BILLED GREBE	SANDERLING
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.26	0.76	0.51	1.79	0.52	3.7	1.51
FLEDGE SURVIVAL RATES (0 TO 1 YEAR OLD)	70%	59%	76%	48%	58.3%	32%	50%
JUVENILE ANNUAL SURVIVAL RATE (AGES) <sup>2</sup>	92% (1-3)	84% (1-3)	55.5% - 91% (1-6)	74% - 85% (1-3)	78.6% - 92.3% (1-6)	32% (0-1)	70% (1-2)
AGE AT FIRST BREEDING	3	3	6	3	5	1	2
ADULT ANNUAL SURVIVAL RATE (AGES)	90.5% (3-11)	78.7% (3-7)	89.5% (6-15)	85% (3-6)	91.4% (5-22)	45% (1-6)	83% (2-7)
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	100%	72.5%	100%	72.4%	90%	100%
% FEMALES IN THE POPULATION	50%	50%	50%	50%	50%	50%	50%
AVERAGE LIFESPAN (YEARS)	11	7	15	6	20	6	7
<p><sup>1</sup> Some of these values represent the mean of information from various literature sources, whereas others are specific values from a single source. Additional details on the derivation of each value presented in this table are included in the appendices to Part II of this document (Appendices II-A through II-G).</p> <p><sup>2</sup> A range is provided in the summary table when individual age group survival data is available in the species-specific appendix.</p>							

APPENDIX II-A: AMERICAN OYSTERCATCHER (*Haematopus palliatus*)

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.26 (Gulf of Mexico-specific value)	0.14 - 0.21 fledglings per pair	McGowan et al. 2005 (as cited in Nol and Humphrey 2012): NC
		0.28 fledglings (34% fledge: 2.64 clutch size × 0.31 hatching success × 0.34) <sup>1</sup>	R. Humphrey unpubl. data (as cited in Nol and Humphrey 2012): MA
		0.44 - 0.66 fledglings (54-80% fledge: 2.64 clutch size × 0.31 hatching success × 0.54/0.8) <sup>1</sup>	Zaradusky 1985 (as cited in Nol and Humphrey 2012): NY
		0.26 fledglings per pair (based on 35 pairs fledging 9 chicks)	Hodgson et al. 2008 (as cited in Nol and Humphrey 2012): FL, Hillsborough Bay
		0.12 fledglings per breeding pair	McGowan 2004 (as cited in Nol and Humphrey 2012): NC, 1998-2003
		0.39 fledglings (0.329 fledgling success: 2.64 clutch size × 0.452 hatching success × 0.329) <sup>1</sup>	Sabine et al. 2006 (as cited in Nol and Humphrey 2012): GA
		0.38 fledglings (0.463 fledgling success: 2.64 clutch size × 0.31 hatching success × 0.463) <sup>1</sup>	Murphy 2010 (as cited in Nol and Humphrey 2012): MA
		0.31 fledglings (0.424 fledgling success: 2.64 clutch size × 0.278 hatching success × 0.424) <sup>1</sup>	Simons and Stocking 2011 (as cited in Nol and Humphrey 2012): NC
		0.35 fledglings (0.438 fledgling success: 2.64 clutch size × 0.31 hatching success × 0.438) <sup>1</sup>	Simons and Schulte 2010 (as cited in Nol and Humphrey 2012): NC
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	70%	70% (age 0 to 1)	Schulte pers. com. 2013
JUVENILE ANNUAL SURVIVAL (AGES 1 TO 3)	92%	92% (ages 1 to 3)	Schulte pers. com. 2013
AGE AT FIRST BREEDING	3	3 years	Palmer 1967 (as cited in Nol and Humphrey 2012): various locations in North America

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
ADULT ANNUAL SURVIVAL (AGES 3+)	90.5% (mean of all values)	88.6% (adult; specific age not specified)	Nol 1985 (as cited in Nol and Humphrey 2012): VA
		94% (adult; specific age not specified)	Murphy 2010 (as cited in Nol and Humphrey 2012): MA
		89% (adult; specific age not specified)	Simons & Schulte 2010 (as cited in Nol and Humphrey 2012): NC
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	<i>Assumption</i>
% FEMALES IN THE POPULATION	50%	--	<i>Assumption as previously described in Assumptions discussion above</i>
AVERAGE LIFESPAN (YEARS)	11	10.5 years <sup>2</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))]; birds living at least 10 years appear to be common) <sup>2</sup>	Calculated from other parameter values
<p><i>Notes:</i></p> <p>1. Estimated mean clutch size calculated using information from Nol and Humphrey 2012 as 2.64 [mean of 2.81 (R. Humphrey unpubl., MA), 3.26 (Zaradusky 1985, NY), 2.33 (R. Humphrey unpubl., VA), 2.32 (McGowan 2004, NC), and 2.5 (Sabine et al. 2006, GA)]. For mean hatching success, we use specific values associated with each source if available or a calculated mean hatching success of 0.31 [mean of 0.204 (McGowan 2004, NC), 0.278 (Simons and Stocking 2011), and 0.452 (Sabine et al. 2006, GA)].</p> <p>2. Oldest banded bird was 17 years old (Nol and Humphrey 2012).</p>			

APPENDIX II-B: AMERICAN WHITE PELICAN (*Pelecanus erythrorhynchos*)

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.76 (mean of all values)	0.85 fledged per nest in herbaceous cover	Knopf 1979 (as cited in Knopf and Evans 2004): UT
		0.85 fledged per nest in shrub cover	
		0.89 fledged per nest near driftwood	
		0.4 - 1 fledglings (mean 0.7: varies by season, later breeding likely represents younger birds)	
		0.3 - 0.68 (mean 0.49)	Sidle et al. 1984 (as cited in Knopf and Evans 2004): ND
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	59%	59% (age 0 to 1)	Strait and Sloan 1974 (as cited in Knopf and Evans 2004): ND
JUVENILE ANNUAL SURVIVAL (AGES 1 TO 3)	84%	84% (age 1 and 2)	Strait and Sloan 1974 (as cited in Knopf and Evans 2004): ND
AGE AT FIRST BREEDING	3	3 years	Sloan 1982 (as cited in Knopf and Evans 2004): North America
ADULT ANNUAL SURVIVAL (AGES 3+)	78.7%	78.7% (age 3+) <sup>1</sup>	Strait and Sloan 1974 (as cited in Knopf and Evans 2004): ND, Ryder 1981 (as cited in Knopf and Evans 2004): CO
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	<i>Assumption</i>
% FEMALES IN THE POPULATION	50%	Unknown but not obviously skewed	Knopf and Evans 2004
AVERAGE LIFESPAN (YEARS)	7	7.2 years <sup>2</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))])	Calculated from other parameter values
<p><i>Notes:</i></p> <p>1. Survival rate remains constant at 78.7% through the thirteenth year (Strait and Sloan 1974, as cited in Knopf and Evans 2004).</p> <p>2. Oldest banded bird was 26.4 years old (Clapp et al. 1982, as cited in Knopf and Evans 2004).</p>			

APPENDIX II-C: COMMON LOON (*Gavia immer*)

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS		REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.51 (mean of all values)	0.48		Smith 1981 (as cited in Evers et al. 2010): AK
		0.4		Vermeer 1973 (as cited in Evers et al. 2010): Alberta, Canada
		0.29		Evers et al. 2003 (as cited in Evers et al. 2010): ME
		0.51 - 0.79 (0.65 mean)		Evers et al. 2000 (as cited in Evers et al. 2010): MI (0.51 eastern upper peninsula, 0.79 Isle Royal National Park, 0.76 Ottawa National Forest, 0.59 Seney NWR)
		0.29		Mcintyre 1978 (as cited in Evers et al. 2010): MN
		0.37		Mooty 1993 (as cited in Evers et al. 2010): MN
		0.66		Mcintyre and Barr 2010 (as cited in Evers et al. 2010): MT
		0.52		Taylor & Vogel 2003 (as cited in Evers et al. 2010): NH
		0.96		Parker & Miller 1988 (as cited in Evers et al. 2010): NY
		0.28		Kerekes & Masse 2000 (as cited in Evers et al. 2010): Nova Scotia, Canada
		0.32		Croskery 1990 (as cited in Evers et al. 2010): Ontario, Canada
		0.61		Kerekes & Masse 2000 (as cited in Evers et al. 2010): Quebec, Canada
		0.53		Yonge 1981 (as cited in Evers et al. 2010): Saskatchewan, Canada
		0.72		Hanson et al. 2002 (as cited in Evers et al. 2010): VT
0.53		Evers 2007 (as cited in Evers et al. 2010): New England and Great Lakes		
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	76%	0.76		Sperduto et al. 2003: Peer-reviewed paper on scaling restoration for North Cape Oil Spill case, RI
JUVENILE ANNUAL SURVIVAL (AGES 1 TO 6)	55.5% (ages 1-2); 60.5% (ages 2-3); 91% (ages 3+)	55.5% (mean, ages 1-2)	70% (age 1)	Mitro et al. 2008: New England and Wisconsin
			41% (ages 1-3)	Evers 2007: New England and Great Lakes
		60.5% (mean, ages 2-3)	80% (ages 2-3)	Mitro et al. 2008: New England and Wisconsin
			91% (adults, ages 3+)	Mitro et al. 2008: New England and Wisconsin

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
AGE AT FIRST BREEDING	6 (mean of all values)	6 years mean	Evers et al. 2000 (as cited in Evers et al. 2010), W. Piper, pers. com. (as cited in Evers et al. 2010)
		Ranges from 4-11 years (7.5 mean)	Evers et al. 2000 (as cited in Evers et al. 2010)
		5 years	Sperduto et al. 2003: Peer-reviewed paper on scaling restoration for North Cape Oil Spill case, RI
		6 years	Evers 2007: New England and Great Lakes
ADULT ANNUAL SURVIVAL (AGES 6+)	89.5% (mean of all values)	91% (adult average, specific age range not specified)	Evers 2007: New England and Great Lakes, Mitro et al. 2008 (as cited in Evers et al. 2010): New England and Great Lakes mean
		88% (adult survival rate, specific age range not specified)	Sperduto et al. 2003: Peer-reviewed paper on scaling restoration for North Cape Oil Spill case, RI
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	72.5% (mean)	68 - 77%	Evers 2007: New England and Great Lakes
% FEMALES IN THE POPULATION	50%	50%	Evers 2001 (as cited in Evers et al. 2010) New England and Great Lakes, Piper et al. 2008 (as cited in Evers et al. 2010): location not specified
AVERAGE LIFESPAN (YEARS)	15	14.6 years <sup>1</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))])	Calculated from other parameter values
<p><i>Notes:</i></p> <p>1. Maximum lifespan reported is 23 years (Evers, as cited in Evers et al. 2010).</p>			

APPENDIX II-D: DOUBLE-CRESTED CORMORANT (*Phalacrocorax auritus*)

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	1.79 (mean of all values)	1.2 - 2.4 (mean productivity per nest 1.8; 1 brood per year)	Drent et al. 1964 (as cited in Hatch and Weseloh 1999): BC
		2.25 (based on a brood size of 1-4 chicks and a fledging success rate of 90%)	Robertson 1971 (as cited in Hatch and Weseloh 1999): BC
		0.95 - 1.67 (1.31 mean chicks fledged per nest with eggs from 1976 - 1977)	Baird and Gould 1983: AK
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	48%	48% (first year survival)	Van der Veen 1973 (as cited in Hatch and Weseloh 1999): BC
JUVENILE ANNUAL SURVIVAL (AGES 1 TO 3)	74% (ages 1-2); 85% (ages 2-3)	74% (age 1-2)	Van der Veen 1973 (as cited in Hatch and Weseloh 1999): BC
		85% (annual survival, age 2+)	Van der Veen 1973 (as cited in Hatch and Weseloh 1999): BC
AGE AT FIRST BREEDING	3 <sup>1</sup>	1 year (4.7%)	Van der Veen 1973 (as cited in Hatch and Weseloh 1999): BC
		2 years (16.5%)	
		3 years (78.8%)	Weseloh and Ewins 1994 (as cited in Hatch and Weseloh 1999): Great Lakes
ADULT ANNUAL SURVIVAL (AGES 3+)	85%	85% (annual survival, age 2+)	Van der Veen 1973 (as cited in Hatch and Weseloh 1999): BC
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	--	<i>Assumption</i>
% FEMALES IN THE POPULATION	50%	No information on sex ratio available	Hatch and Weseloh 1999: <i>Assumption as previously described in Assumptions discussion above</i>
AVERAGE LIFESPAN (YEARS)	6	6 years <sup>2</sup> (calculated average lifespan using a 0.48 first-year survival rate, 0.74 second-year, and subsequent annual survival of 0.85)	Van der Veen 1973 (as cited in Hatch and Weseloh 1999): BC
<p><i>Notes:</i></p> <p>1. Age of 3 years at first breeding may underestimate part of the population, since some individuals breed at ages 1 and 2 (Van der Veen 1993, as cited in Hatch and Welseloh 1999).</p> <p>2. Oldest banded bird was 17 years and 9 months old (Klimkiewicz and Futcher 1989, as cited in Hatch and Welseloh 1999).</p>			

**APPENDIX II-E: GREAT SHEARWATER (*Puffinus gravis* - much of the information from various species in the genus *Puffinus*)**

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
# FLEDGLINGS PER BREEDING PAIR PER YEAR	0.52 (Great Shearwater-specific value)	0.62 (based on a 70% hatching success rate, a 89% fledging success rate, and a clutch size of 1 egg)	Harris 1966 (as cited in Lee and Haney 1996): Wales; Perrins et al. 1973 (as cited in Lee and Haney 1996): Wales, Manx Shearwaters ( <i>Puffinus puffinus</i> )
		0.453 (based on a 71.5% hatching success rate, a 63.3% fledging success rate, and a clutch size of 1 egg)	Byrd et al. 1983 (as cited in Whittow 1997): Hawaii, Wedge-tailed Shearwaters ( <i>Puffinus pacificus</i> )
		0.66 (based on 66% of nests producing fledglings for a clutch size of 1 egg)	Brooke 1990 (as cited in Ainley et al. 1997): UK, Townsend and Newell's Shearwaters ( <i>Puffinus auricularis</i> )
		0.543 (based on a 65% hatching success rate, a 83.5% fledging success rate, and a clutch size of 1 egg)	Gallagher 1960 (as cited in Seto 2001): Australia, Christmas Shearwaters ( <i>Puffinus nativitatis</i> )
		0.52 (based on a 56% hatching success rate, 93% fledging success rate, and a clutch size of 1 egg)	Cuthbert 2005: South Atlantic, Gough Island
		0.306	Hunter and Caswell 2005: New Zealand, Sooty Shearwaters ( <i>Puffinus griseus</i> )
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	58.3%	0.583	Hunter et al. 2000: Australia, Short-tailed Shearwaters ( <i>Puffinus tenuirostris</i> )
JUVENILE ANNUAL SURVIVAL (AGES 1 TO 6)	78.6% - 92.3%	78.6% (calculated based on observation that 30% of birds survive to adulthood, annual average for ages 1-6)	Perrins et al. 2008: Wales, Manx Shearwaters ( <i>Puffinus puffinus</i> )
		86.7% (age 1-2)	Hunter et al. 2000: Australia, Short-tailed Shearwaters ( <i>Puffinus tenuirostris</i> )
		92.3% (age 2-3)	
		91.2% (ages 3+)	
AGE AT FIRST BREEDING	5 (mean of all values)	5-6 years (5.5 mean)	Perrins et al. 1973 (as cited in Lee and Haney 1996): Wales; Perrins et al. 2008: Wales, Manx Shearwaters ( <i>Puffinus puffinus</i> )
		4 years	Floyd and Swanson 1983 (as cited in Whittow 1997): Australia, Wedge-tailed Shearwaters ( <i>Puffinus pacificus</i> )
		4-5 years (4.5 mean)	Cramp 1978 and 1985 and Cramp and Simmons 1983 as cited in Furness and Monaghan 1987: North Atlantic, Manx Shearwaters ( <i>Puffinus puffinus</i> )

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE
		6 years	Brooke 1990 (as cited in Ainley et al. 1997): UK, Townsend and Newell's Shearwaters ( <i>Puffinus auricularis</i> )
		7 years	Hunter et al. 2000: Australia, Short-tailed Shearwaters ( <i>Puffinus tenuirostris</i> )
ADULT ANNUAL SURVIVAL (AGES 6+)	91.4% (mean of all values)	90.2% (minimum survival rate of adults, range of 79.4-96.5)	Perrins et al. 1973 (as cited in Lee and Haney 1996): Wales, Manx Shearwaters ( <i>Puffinus puffinus</i> )
		90% (adult annual survivorship)	Brooke 1990 (as cited in Ainley et al. 1997): UK, Townsend and Newell's Shearwaters ( <i>Puffinus auricularis</i> )
		90%	Cramp 1978 and 1985 and Cramp and Simmons 1983 as cited in Furness and Monaghan 1987: North Atlantic, Manx Shearwaters ( <i>Puffinus puffinus</i> )
		95.2%	Clucas et al. 2008: New Zealand, Sooty Shearwaters ( <i>Puffinus griseus</i> )
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	72.4% (mean of all values)	46%	Brooke 1990 (as cited in Ainley et al. 1997): UK, Townsend and Newell's Shearwaters ( <i>Puffinus auricularis</i> )
		100%	Gallagher 1960 (as cited in Seto 2001): South Atlantic, Gough Island, Christmas Shearwaters ( <i>Puffinus nativitatis</i> )
		70 - 80% (75% mean)	Brooke 1990 (as cited in Lee and Haney 1996): UK, Manx Shearwaters ( <i>Puffinus puffinus</i> )
		68.6%	Hunter and Caswell 2005: New Zealand, Sooty Shearwaters ( <i>Puffinus griseus</i> )
% FEMALES IN THE POPULATION	50%	Manx shearwater; presumed to be 1:1	Lee and Haney 1996
AVERAGE LIFESPAN (YEARS)	20 (mean)	16 years <sup>1</sup>	Perrins et al. 1973: Wales, Manx Shearwater ( <i>Puffinus puffinus</i> ), calculated average lifespan based on survival data
		14 years	Cramp 1978 and 1985 and Cramp and Simmons 1983 as cited in Furness and Monaghan 1987: North Atlantic, Manx Shearwaters ( <i>Puffinus puffinus</i> )
		29 years <sup>1</sup>	Harris 1966 (as cited in Lee and Haney 1996): Wales, Manx Shearwater, average life expectancy for adults ( <i>Puffinus puffinus</i> )
<p>Note that although great shearwater (<i>Puffinus gravis</i>) is the focal species, the table above includes information from a number of related species because species-specific information was limited. Information presented in this table is from a study conducted on great shearwaters unless otherwise stated.</p> <p>Notes:</p> <p>1. Oldest banded Manx shearwater was 36 years old (Brooke 1990); oldest banded Wedge-tailed shearwater was 29 years old (Whitton 1997); oldest record for Christmas shearwater is 17 years on Laysan Island (K. Swift pers. com., as cited in Seto 2001). Due to the lack of information readily available on the average lifespan for Great shearwaters, we present the mean of the three reported average life expectancy values for Manx shearwater.</p>			

**APPENDIX II-F: PIED-BILLED GREBE (*Podilymbus podiceps* - much of the information is based on various related genera in the family Podicipedidae)**

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE/NOTES
# FLEDGLINGS PER BREEDING PAIR PER YEAR	3.7	Based on 39.7 - 98% hatching success rate, 60.2 - 62.2% fledging success rate, clutch size of 4.3 - 8 eggs; 42.8% produce 2 broods per year <sup>1</sup>	Glover 1953 (IA), Chabreck 1963 (LA), Cottam and Glazener 1959 (TX), Wolf 1955 (ID), Otto 1983 (WI), Muller 1995 (WA), Arnold 1990 (Manitoba, Canada), and Forbes et al. 1989 (Nova Scotia, Canada)
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	32%	Ratio of young birds to adult pairs in the Fall is 1.2 (ranges from 0.70 - 1.7) <sup>2</sup> ; survival rate estimated by dividing 1.2 by the estimated number of fledglings per breeding pair ( $1.2 \div 3.7 = 32\%$ )	Lindvall and Low 1982 (as cited in LaPorte et al. 2013): UT, Western grebe ( <i>Aechmophorus occidentalis</i> )
JUVENILE ANNUAL SURVIVAL (AGES 0 TO 1; SAME AS ABOVE)	32%	Same as fledge survival rate since grebes reach sexual maturity (adulthood) at 1 year old	Lindvall and Low 1982 (as cited in LaPorte et al. 2013): UT, Western grebe ( <i>Aechmophorus occidentalis</i> )
AGE AT FIRST BREEDING	1 <sup>2</sup>	13-14 months (captive breeding birds)	MacVean 1988 and MacVean 1990 (as cited in Muller and Storer 1999): Guatemala
		1 year (wild birds)	Fjelds� 1973 (as cited in Stedman 2000): Iceland, Horned grebe ( <i>Podiceps auritus</i> )
ADULT ANNUAL SURVIVAL (AGES 1+)	45% (Pied-billed grebe-specific number)	61% - 100% (annual survival rates of banded adult birds)	GLN and D. Buitron unpublished (as cited in Stout and Nuechterlein 1999): MN, Red-necked grebe ( <i>Podiceps grisegena</i> )
		40 - 50% (annual adult survival rate)	Johnsgard 1987: North America
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	90%	90%	Fjelds� 1973 (as cited in Stedman 2000): Iceland, Horned grebe ( <i>Podiceps auritus</i> )
% FEMALES IN THE POPULATION	50%	No data available	Muller and Storer 1999: <i>Assumption as previously described in Assumptions discussion above</i>
AVERAGE LIFESPAN (YEARS)	6	5.6 years <sup>3</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))])	Calculated from other parameter values
<p>Note that although pied-billed grebe (<i>Podilymbus podiceps</i>) is the focal species, the table above includes information from a number of related species because species-specific information was limited. Information presented in this table is from a study conducted on pied-billed grebes unless otherwise stated.</p> <p>Notes:</p> <p>1. # fledglings = 6.15 (mean eggs/pair) × 0.6885 (mean hatching success rate) × 0.612 (mean fledging success rate) × 1.43 (broods per year).</p> <p>2. The mean of 12.75 was taken to be equivalent to one year of age.</p> <p>3. Oldest banded crested grebe was 9 years 8 months old (Cramp and Simmons 1977, as cited in Muller and Storer 1999); oldest banded little grebe was 13 years old (Cramp and Simmons 1977, as cited in Muller and Storer 1999); oldest bird marked with nasal tag as adult was 15 years old (Eichhorst 1992, as cited in LaPorte et al. 2013).</p>			

**APPENDIX II-G: SANDERLING (*Calidris alba* - some information provided here is compiled from related species in the genus *Calidris*)**

LIFE HISTORY / DEMOGRAPHIC PARAMETER	RECOMMENDED VALUE	DETAILS	REFERENCE/NOTES
# FLEDGLINGS PER BREEDING PAIR PER YEAR	1.51 fledglings (mean of related species)	1.45 (36.3% fledging success in dunlins equates to 1.45 fledglings using clutch size of 4)	Jönsson 1991 (as cited in Warnock and Gill 1996): Sweeden, Dunlin ( <i>Calidris alpina</i> )
		0.9 - 2.23 fledglings per pair in least sandpipers (1.56 mean)	Cooper and Miller 1997 (as cited in Nebel and Cooper 2008): British Columbia, Least sandpiper ( <i>Calidris minutilla</i> )
FLEDGE SURVIVAL RATES (FROM FLEDGLING TO 1 YEAR OLD)	50%	50% (first year rate)	Myers 1980 (as cited in MacWhirter et al. 2002): CA
JUVENILE ANNUAL SURVIVAL (AGES 1 TO 2)	70%	70% (estimated average for age 1 to 2)	Value estimated by Mike Szumski, NRDA/Spill Response, U.S. Fish & Wildlife Service, Portland, OR, October 12, 2004, and finalized on May 7, 2005 using fledgling and adult survival estimates
AGE AT FIRST BREEDING	2	2 years	Meltofte 1985 (as cited in MacWhirter et al. 2002): Greenland
ADULT ANNUAL SURVIVAL (AGES 2+)	83%	83% (adult survivorship based on annual resightings of banded wintering sanderlings)	Evans and Pienkowski 1984 (as cited in MacWhirter et al. 2002): UK
% OF ADULT FEMALE POPULATION THAT BREEDS EACH YEAR	100%	<i>Assumption</i>	<i>Assumption</i>
% FEMALES IN THE POPULATION	50%	No sex ratio data available	MacWhirter et al. 2002: <i>Assumption as previously described in Assumptions discussion above</i>
AVERAGE LIFESPAN (YEARS)	7	7.4 years <sup>1</sup> (calculated using equation: Life expectancy = [age at first breeding + (1/ln(adult survival rate))])	Calculated from other parameter values
<p>Note that although sanderling (<i>Calidris alba</i>) is the focal species, the table above includes information from a related species for fledglings per breeding pair because species-specific information was limited. Information presented in this table is from a study conducted on sanderling unless otherwise stated.</p> <p><i>Notes:</i></p> <p>1. Longest lifespan reported was 13 years (Boates and McNeil 1984, as cited in MacWhirter et al. 2002).</p>			

## REFERENCES

- Donald, P.F. 2007. Adult sex ratios in wild bird populations. *Ibis* 149: 671-692.
- Brown Pelican** (*Pelecanus occidentalis*)
- Anderson, D. W., F. Gress, and K. F. Mais. 1982. Brown Pelicans: Influence of Food Supply on Reproduction. *Oikos* 39: 23-31.
- Anderson, D. W., F. Gress, and D. M. Fry. 1996. Survival and dispersal of oiled Brown pelicans after rehabilitation and release. *Marine Pollution Bulletin* 32: 711-718.
- Blus, L. J. and J. A. Keahey. 1978. Variation in reproductivity with age in the Brown Pelican. *Auk* 95:128-134.
- Collazo, J. A. 1985. Status and ecology of the Brown pelican in the Greater Puerto Rican Bank region. Ph.D. diss. Iowa State University, Ames.
- Gress, F. 2013. Personal Communication with Franklin Gress, California Department of Fish and Game.
- Henny, C. J. 1972. An analysis of the population dynamics of selected avian species. Wildlife Research Report 1, *Bureau of Sport Fisheries and Wildlife*, Washington D.C. (as cited by Schreiber and Mock 1988).
- Kure/Humboldt Bay Trustee Council. 2008. Kure/Humboldt Bay Oil Spill Final Damage Assessment and Restoration Plan/Environmental Assessment. Prepared by California Department of Fish and Game, United States Fish and Wildlife Service.
- LDWF. 2008. Louisiana Brown Pelican Program Status Report for 2007. Prepared by Tom Hess and Jeb Linscombe.
- LDWF. 2010. Wildlife Insider, Winter. The Louisiana Brown Pelican Program, Tom Hess, Wildlife Biologist Manager.
- Luckenbach Trustee Council. 2006. S.S. Jacob Luckenbach and Associated Mystery Oil Spills Final Damage Assessment and Restoration Plan/Environmental Assessment. Prepared by California Department of Fish and Game, National Oceanic and Atmospheric Administration, United States Fish and Wildlife Service, National Park Service.
- McNease, L. 1998. Louisiana eastern Brown pelican annual progress report, 1998. LDWF.
- McNease, L., Richard, D., and T. Joanen. 1992. Reintroduction and colony expansion of the Brown pelican in Louisiana. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies* 46: 223-229.
- McNease, L., T. Joanen, D. Richard, J. Shepard, and S. A. Nesbitt. 1984. The Brown pelican restocking program in Louisiana. *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 38: 165-173.

- Schreiber, R. W. 1979. Reproductive performance of the Eastern Brown Pelican, *Pelecanus occidentalis*. Nat. Hist. Mus. Los Angeles Co. Contrib. Sci. no. 317.
- Schreiber, R. W. and P. J. Mock. 1988. Eastern Brown Pelicans: what does 60 years of banding tell us? *J. Field Ornithol.* 59:171-182.
- Schreiber, R. W., E. A. Schreiber, D. W. Anderson, and D. W. Bradley. 1989. Plumages and molts of Brown Pelicans. Nat. Hist. Mus. Los Angeles Co. Contrib. Sci. no. 402.
- Shields, Mark. 2002. Brown Pelican (*Pelecanus occidentalis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/609>.
- USFWS. 1983. The California Brown Pelican recovery plan. Prepared by F. Gress and D. W. Anderson. U.S. Fish Wildl. Serv. Portland, OR.
- USFWS. 2007. U.S. Fish and Wildlife Service. 2007. Listed distinct population segment of the Brown pelican (*Pelecanus occidentalis*) 5-year review: summary and evaluation. USFWS Division of Ecological Services, Albuquerque, N.M. 66 pp.
- USFWS. 2012. Brown pelican species profile.
- Williams, L. E., Jr. and T. Joanen. 1974. Age of first nesting in the Brown pelican. *Wilson Bull.* 86(3):279-280.

#### **Clapper rail (*Rallus longirostris*)**

- Adams, D. A. and T. L. Quay. 1958. Ecology of the Clapper Rail in southeastern North Carolina. *J. Wildl. Manage.* 22:149-156.
- Clapp, R. B., M. K. Klimkiewicz, and J. H. Kennard. 1982. Longevity records of North American birds: Gaviidae through Alcidae. *J. Field Ornithol.* 53:81-124.
- Eddleman, W. R. 1989. Biology of the Yuma Clapper Rail in the southwestern U.S. and northwestern Mexico. Final Rept., Intra-Agency Agreement No. 4-AA-30-02060. U.S. Bur. Reclam., Yuma Proj. Off. Yuma, AZ.
- Hoffman, S. M. 2001. Demography of light-footed Clapper Rail populations in two southern California salt marshes. M.Sc. thesis. University of California, Irvine.
- Meanley, B. 1985. The Marsh Hen: A Natural History of the Clapper Rail of the Atlantic Coast Salt Marsh. Tidewater Publishers, Centreville, MD. 123p.
- Rush, S., M. Woodrey, and R. Cooper. 2010. Variation in the Nesting Habits of Clapper Rails in Tidal Marshes of the Northern Gulf of Mexico. *Condor* 112: 356-362.
- Rush, Scott A., Karen F. Gaines, William R. Eddleman and Courtney J. Conway. 2012. Clapper Rail (*Rallus longirostris*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/340>.

Sharp, T. L. 1976. Productivity and distribution of the Clapper Rail in a Louisiana salt marsh. Master's Thesis. Louisiana State Univ., Baton Rouge, LA.

**Great blue heron (*Ardea herodias*)**

Baker, S. D. and M. S. Sepulveda. 2009. An evaluation of the effects of persistent environmental contaminants on the reproductive success of Great Blue Herons (*Ardea herodias*) in Indiana. *Ecotoxicology* 18(3):271-280.

Burkholder, G. and D. G. Smith. 1991. Nest trees and productivity of Great Blue Herons (*Ardea herodias*) at Knox Lake, north-central Ohio. *Colonial Waterbirds* 14(1):61-62.

Butler, R.W. 1992. Great Blue Heron (*Ardea herodias*). From *The Birds of North America*, No. 25. Editors A. Poole, P. Stettenheim, and F. Gill. The Academy of Natural Sciences of Philadelphia.

Butler, R. W. 1995. The patient predator: foraging and population ecology of the Great Blue Heron *Ardea herodias* in British Columbia. *Canadian Wildlife Service Occasional Paper* 86:1-44.

Butler, R. W. 1997. The Great Blue Heron: a natural history and ecology of a seashore sentinel. Univ. Brit. Col. Press, Vancouver, B. C.

Henny, C. J. 1972. An analysis of the population dynamics of selected avian species with special reference to changes during the modern pesticide era. Wildl. Res. Rep. I. U.S. Fish Wildl. Serv., Washington, D.C.

INRIN (Illinois Natural Resources Information Network). 2003. Great Blue Heron. (<http://www.inhs.uiuc.edu/chf/pub/ifwis/birds/great-blue-heron.html>).

Kelly, J. P., K. Etienne, C. Strong, M. McCaustland, and M. L. Parkes. 2007. Status, trends, and implications for the conservation of Heron and Egret nesting colonies in the San Francisco Bay area. *Waterbirds* 30(4):455-478.

Powell, G. V. N. and A. H. Powell. 1986. Reproduction by Great White Herons *Ardea herodias* in Florida Bay as an indicator of habitat quality. *Biological Conservation* 36(2):101-113.

Pratt, H. M. 1970. Breeding biology of Great Blue Herons and Common Egrets in central California. *Condor* 72:407-416.

Quinney, T. E. 1983. Comparison of Great Blue Heron, *Ardea herodias*, reproduction at Boot Island and other Nova Scotia colonies. *Canadian Field-Naturalist* 97(3):275-278.

Vennesland, R. G. and R. W. Butler. 2004. Factors influencing Great Blue Heron nesting productivity on the Pacific Coast of Canada from 1998 to 1999. *Waterbirds* 27(3):289-296.

- Vennesland, R. G. and R. W. Butler. 2011. Great blue heron (*Ardea herodias*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/025>.
- Vos, D. K., D. A. Ryder, and W. D. Graul. 1985. Response of breeding Great Blue Herons to human disturbances in northcentral Colorado. *Colonial Waterbirds* 8: 13-22.
- Witt, J. W. 2006. Great Blue Heron productivity at Mason Neck National Wildlife refuge in Northern Virginia, and the potential impacts of weather during a 13-year interval. *Waterbirds* 29(3):345-349.

**Laughing gull (*Leucophaeus atricilla*)**

- Burger, Joanna. 1996. Laughing Gull (*Leucophaeus atricilla*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/225>.
- Butler, R. W., N. A.M. Verbeek, and R. G. Footitt. 1980. Mortality and dispersal of the Glaucous-winged Gulls of southern British-Columbia. *Canadian Field-Naturalist* 94(3):315-320.
- CA DFG (California Department of Fish and Game) and USFWS. 2008. Kure/Humboldt Bay Oil Spill Final Damage Assessment and Restoration Plan/Environmental Assessment. July.
- Coulson, J. G. and E. White. 1959. The post-fledging mortality of the Kittiwake. *Bird Study* 6:97-102.
- Hatch, Scott A., Gregory J. Robertson and Pat Herron Baird. 2009. Black-legged Kittiwake (*Rissa tridactyla*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/092>
- Hayward, James L. and N. A. Verbeek. 2008. Glaucous-winged Gull (*Larus glaucescens*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/059>.
- Klimkiewicz, M. K. Personal Communication with Mary Kathleen Klimkiewicz as referenced by Burger 1996, U.S. Geological Survey Bird Banding Laboratory.
- Morris, R. D. 1984. Breeding chronology and reproductive success of seabirds on Little Tobago, Trinidad, 1975-1976. *Colon. Waterbirds* 7:1-9.
- Reid, W. V. 1987. Constraints on clutch size in the glaucous-winged gull. *Studies in Avian Biology*: 8-25.

- Schreiber, E. A., R. W. Schreiber, and J. J. Dinsmore. 1979. Breeding biology of Laughing Gulls in Florida. Part I: nesting, egg, and incubation parameters. *Bird Banding* 50:304-321.
- White, D. H., C. A. Mitchell, and R. M. Prouty. 1983. Nesting biology of Laughing Gulls in relation to agricultural chemicals in south Texas, 1978-81. *Wilson Bull.* 95:540-551.
- Mallard** (*Anas platyrhynchos*)
- Alisauskas, R. T. and C. D. Ankney. 1992. The cost of egg laying and its relationship to nutrient reserves in waterfowl in B. D. J. Batt, A. D. Afton, M. G. Anderson, C. D. Ankney, D. H. Johnson, J. A. Kadlec, and G. L. Krapu (eds.). Ecology and management of breeding waterfowl. University of Minnesota Press, Minneapolis, USA, pp. 30-61.
- Anderson, D. R. 1975. Population ecology of the Mallard: V. Temporal and geographic estimates of survival, recovery and harvest rates. U.S. Fish Wildl. Serv. Resour. Publ. 125.
- Arnold, T. W. and R. G. Clark. 1996. Survival and philopatry of female dabbling ducks in southcentral Saskatchewan. *J. Wildl. Manage.* 60:560-568.
- Cowardin, L. M., D. S. Gilmer, and C. W. Shaiffer. 1985. Mallard recruitment in the agricultural environment of North Dakota. *Wildl. Monogr.* 92:1-37.
- Drilling, Nancy, Rodger Titman and Frank Mckinney. 2002. Mallard (*Anas platyrhynchos*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/658>.
- Duebbert, H. F., J. T. Lokemoen, and D. E. Sharp. 1983. Concentrated nesting of Mallards and Gadwall on Miller Lake Island, North Dakota. *J. Wildl. Manage.* 47:309-321.
- Dzubin, A. and J. B. Gollop. 1972. Aspects of Mallard breeding ecology in Canadian parkland and grassland. Pages 113-152 in Population ecology of migratory birds. U.S. Fish Wildl. Serv. Rep. no. 2.
- Kennard, J. H. 1975. Longevity records of North American birds. *Bird-Banding* 46:55-73.
- Kirby, R. E. and G. A. Sargeant. 1999. Survival of postfledging Mallards in northcentral Minnesota. *J. Wildl. Manage.* 63:403-408. Available at: <http://www.npwrc.usgs.gov/resource/birds/postfled/>
- Mausser, D. M., R. L. Jarvis, and D. S. Gilmer. 1994. Survival of radio-marked Mallard ducklings in northeastern California. *J. Wildl. Manage.* 58:82-87.
- Munro, R. E. and C. F. Kimball. 1982. Population Ecology of the Mallard: VII. Distribution and Derivation of the Harvest. U.S. Fish and Wildlife Service, Resource

Publication 147. Washington, D.C. Retrieved from: <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA323210>

Palmer, R. S. 1976. Handbook of North American birds, Vol. 2. Yale University Press, New Haven, CT.

Pehrsson, O. 1991. Egg and clutch size in the mallard as related to food quality. *Can. J. Zool.* 69(1):156-162.

Rohwer, F. C. and M. G. Anderson. 1988. Female-biased philopatry, monogamy, and the timing of pair formation in migratory waterfowl. *Curr. Ornithol.* 5:187-221.

Smith, G. W. and R. E. Reynolds. 1992. Hunting and Mallard survival, 1979-88. *J. Wildl. Manage.* 56:306-316.

Talent, L. G., R. L. Jarvis, and G. L. Krapu. 1983. Survival of Mallard broods in south-central North Dakota. *Condor* 85:74-78.

#### **Northern gannet (*Morus bassanus*)**

Chapdelaine, G., P. Laporte, and D. N. Nettleship. 1987. Population, productivity and DDT contamination trends of Northern gannets (*Sula bassanus*) at Bonaventure Island, Quebec, 1967-1984. *Can. J. Zool.* 65: 2922-2926.

Mowbray, Thomas B. 2002. Northern Gannet (*Morus bassanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/693>.

Nelson, J. B. 1978. The Sulidae: gannets and boobies. Oxford University Press, London, UK.

Nelson, J. B. 1978a. The Gannet. Buteo Books, Vermillion, SD.

#### **Seaside Sparrow (*Ammodramus maritimus*)**

Dean, T. F. and J. L. Morrison. 1999. Movements, behavior, habitat use, and survival of juvenile Cape Sable seaside sparrows (*Ammodramus maritimus mirabilis*). June 1998-March 1999. Unpublished report. Everglades National Park, Homestead, FL.

Lockwood, J. L., K. H. Fenn, J. M. Caudill, D. Okines, O. L. Bass, J. R. Duncan, and S. L. Pimm. 2001. The implications of Cape Sable Seaside Sparrow demography for Everglades restoration. *Animal Conservation* 4:275-281.

Marshall, R. M. and S. E. Reinert. 1990. Breeding ecology of Seaside Sparrows in a Massachusetts salt marsh. *Wilson Bull.* 102: 501-513.

McDonald, M.V. Personal communication with William Post, as cited in Post and Greenlaw 2009.

Post, W. and J. S. Greenlaw. 1982. Comparative costs of promiscuity and monogamy: a test of reproductive effort theory. *Behav. Ecol. Sociobiol.* 10:101-107.

- Post, W., J. S. Greenlaw, T. L. Merriam, and L. A. Wood. 1983. Comparative ecology of northern and southern populations of the Seaside Sparrow. p. 123-136 in *The Seaside Sparrow, its biology and management*. (Quay, T. L., J. B. Funderburg, Jr., D. S. Lee, E. F. Potter, and C. S. Robbins, Eds.) Occas. Pap. North Carolina Biol. Surv. Raleigh, NC.
- Post, William, W. Post and J. S. Greenlaw. 2009. Seaside Sparrow (*Ammodramus maritimus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/127doi:10.2173/bna.127>.
- Sykes, Jr., P. W. 1980. Decline and disappearance of the Dusky Seaside Sparrow from Merritt Island, Florida. *Am. Birds* 34:728-737.
- Werner, H. W. 1975. The biology of the Cape Sable Sparrow. Project completion report prepared for the U.S. Nat. Park Serv. Everglades Nat. Park, FL.

#### **American Oyster Catcher (*Haematopus palliatus*)**

- Hodgson, A. B., A. F. Paul, and M. L. Rachal. 2008. American Oystercatcher nesting in Hillsborough Bay, Florida: Population trends 1990-2007 and management recommendations. Florida Coastal Islands Sanctuaries. Sovereign Lands Management Initiatives Program 2006. Tampa Port Authority, Tampa.
- McGowan, C. P. 2004. Factors affecting nesting success of American Oystercatchers (*Haematopus palliatus*) in North Carolina. M.Sc. thesis. North Carolina State University, Raleigh.
- McGowan, C. P., T. R. Simons, W. Golder, and J. Cordes. 2005. A comparison of American Oystercatcher reproductive success on barrier beach and river island habitats in coastal North Carolina. *Waterbirds* 28(2):150-155.
- Murphy, S. P. 2010. Population dynamics of the American Oystercatcher (*Haematopus palliatus*) near the northern limit of its range. Ph.D. dissertation. City University of New York, New York.
- Nol, E. and Robert C. Humphrey. 2012. American Oystercatcher Working Group. American Oystercatcher (*Haematopus palliatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/082>.
- Nol, E. 1985. Sex roles in the American Oystercatcher. *Behaviour* 95:232-260.
- Palmer, R. S. 1967. Species accounts. Pages 143-167 in *Shorebirds of North America*. (Stout, G. D., Ed.) Viking Press, NY.
- Sabine, J. B., S. H. Schweitzer, and J. M. Meyers. 2006. Nest fate and productivity of American Oystercatchers, Cumberland Island National Seashore, Georgia. *Waterbirds* 29(3):308-314.

- Schulte, S. 2013. Personal Communication with Shiloh Schulte, American Oystercatcher Recovery Campaign Coordinator, Shorebird Recovery Project, Manomet Center for Conservation Sciences.
- Simons, T. R. and S. Schulte. 2010. American Oystercatcher (*Haematopus palliatus*) research and monitoring in North Carolina. Final report. USGS North Carolina Cooperative Fish and Wildlife Research Unit, Department of Zoology, North Carolina State University, Raleigh.
- Simons, T. R. and J. J. Stocking. 2011. American Oystercatcher conservation initiative in North Carolina: 2010 report. USGS North Carolina Cooperative Fish and Wildlife Research Unit, Department of Biology, North Carolina State University, Raleigh.
- Zaradusky, J. D. 1985. Breeding status of the American Oystercatcher in the town of Hempstead. *Kingbird* 35:105-113.

**American White Pelican (*Pelecanus erythrorhynchos*)**

- Clapp, R. B., M. K. Klimkiewicz, and J. H. Kennard. 1982. Longevity records of North American birds: Gaviidae through Alcidae. *J. Field Ornithol.* 53:81-124.
- Knopf, F. L., and Evans, R. M. 2004. American White Pelican (*Pelecanus erythrorhynchos*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/057>
- Knopf, F. L. 1979. Spatial and temporal aspects of colonial nesting of White Pelicans. *Condor* 81:353-363.
- Ryder, R. A. 1981. Movements and mortality of White Pelicans fledged in Colorado. *Waterbirds* 4:72-76.
- Sidle, J. G., P. M. Arnold, and R. K. Stroud. 1984. Notes on mortality of American White Pelicans at Chase Lake, North Dakota. *Prairie Nat.* 16:131-134.
- Sloan, N. F. 1982. Status of breeding colonies of White Pelicans in the United States through 1979. *Am. Birds* 36:250-254.
- Strait, L. E. and N. F. Sloan. 1974. Life table analysis for the *White Pelican*. *Inland Bird Banding News* 46:20-28

**Common Loon (*Gavia immer*)**

- Croskery, P. R. 1990. The importance of individual territories to the long-term production of Common Loons, *Gavia immer*, in northwestern Ontario. *Canadian Field-Naturalist* 104(4):557-560.
- Evers, D. C. 2001. Common Loon population studies: Continental mercury patterns and breeding territory philopatry. Ph.D. dissertation. Univ. of Minnesota, St. Paul, Minnesota.

- Evers, D. C. 2007. Status assessment and conservation plan for the Common Loon (*Gavia immer*) in North America. BRI Report 2007-20. U.S. Fish and Wildlife Service, Hadley, MA.
- Evers, D. C., D. P. James, J. W. McIntyre, and J. F. Barr. 2010. Common Loon (*Gavia immer*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/313> doi:10.2173/bna.313
- Evers, D., J. D. Kaplan, P. S. Reaman, J. D. Paruk, and P. Phifer. 2000. A demographic characterization of the Common Loon in the upper Great Lakes. Pages 78-90 in Loons: Old history and new findings. Proceedings of a Symposium from the 1997 meeting. (McIntyre, J. W. and D. Evers, Eds.) Am. Ornithol. Union, N. Am. Loon Fund, Holderness, NH.
- Evers, D. C., K. M. Taylor, A. Major, R. J. Taylor, R. H. Poppenga, and A. M. Scheuhammer. 2003. Common Loon eggs as indicators of methylmercury availability in North America. *Ecotoxicology* 12(1-4):69-81.
- Hanson, E. W., C. C. Rimmer, and J. Gobeille. 2002. The 2001 breeding status of Common Loons in Vermont. Unpubl. Rept. Vermont Inst. of Natural Science, Woodstock, Vermont.
- Kerekes, J. J. and D. C. Masse. 2000. Comparison of Common Loon populations, based on long term monitoring, in Kejimikujik National Park, Nova Scotia and La Maurice National Park, Quebec. Pages 66-68 in Loons: Old history and new findings. Proceedings of a Symposium from the 1997 meeting, American Ornithologists' Union. (McIntyre, J. W. and D. Evers, Eds.) N. Am. Loon Fund, Holderness, New Hampshire.
- McIntyre, J. W. 1978. Wintering behavior of Common Loons. *Auk* 95:396-403.
- McIntyre, J. W. and J. F. Barr. 2010. Common Loon (*Gavia immer*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/313>.
- Mitro, M. G., D. C. Evers, M. W. Meyer, and W. H. Piper. 2008. Common Loon survival rates and mercury in New England and Wisconsin. *Journal of Wildlife Management* 72(3):665-673.
- Mooty, J. 1993. Common Loon (*Gavia immer*) numbers in Knife Lake Vicinity of the Boundary Waters Canoe Wilderness Area of Minnesota. Pages 101-103 in The loon and its ecosystem: status, management, and environmental concerns. 1992 American Loon Conference Proceedings. (Morse, L., S. Stockwell, and M. Pokras, Eds.) U.S. Fish Wildl. Serv. Concord, NH.
- Parker, K. E. and R. L. Miller. 1988. Status of New York's Common Loon population: comparison of two intensive surveys. Pages 145-156 in Papers from the 1987 Conference on Common Loon Research and Management. (Strong, P. I. V., Ed.) North American Loon Fund, Meredith, NH.

- Piper, W. H., C. Walcott, J. N. Mager, and F. J. Spilker. 2008. Fatal battles in Common Loons: a preliminary analysis. *Animal Behaviour* 75:1109-1115
- Piper W. Personal communication, as cited in Evers et al. 2010.
- Smith, E. L. 1981. Effects of canoeing on Common Loon production and survival on the Kenai National Wildlife Refuge, Alaska. M.S. thesis. Colorado State Univ. Fort Collins, CO.
- Sperduto, M. B., S. P. Powers, and M. Donlan. 2003. Scaling restoration to achieve quantitative enhancement of loon, seaduck, and other seabird populations. *Marine Ecol. Progress Series* 264:221-232.
- Taylor, K. and H. S. Vogel. 2003. Summary of New Hampshire loon preservation committee: loon activities in 2002. Unpubl. Rept, Loon Preservation Committee, Moultonborough, NH.
- Vermeer, K. 1973. Some aspects of the breeding and mortality of Common Loons in east-central Alberta. *Can. Field-Nat.* 87:403-408.
- Yonge, K. S. 1981. The breeding cycle and annual production of the Common Loon (*Gavia immer*) in the boreal forest region. Master's Thesis. Univ. of Manitoba, Winnipeg.
- Double Crested Cormorant (*Phalacrocorax auritus*)**
- Baird, P. A. and P. J. Gould. 1983. The Breeding Biology and Feeding Ecology of Marine Birds in the Gulf of Alaska. USFWS Final Report Outer Continental Shelf Environmental Assessment Program Research Unit 341. Accessed at: <http://www.data.boem.gov/PI/PDFImages/ESPIS/0/425.pdf>
- Drent, R., G. F. Van Tets, F. Tompa, and K. Vermeer. 1964. The breeding birds of Mandarte Island, British Columbia. *Can. Field-Nat.* 78:208-61.
- Hatch, J. J. and D. V. Weseloh. 1999. Double-crested Cormorant (*Phalacrocorax auritus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/441doi:10.2173/bna.441>.
- Klimkiewicz, M. K. and A. G. Fitcher. 1989. Longevity records of North American birds. *J. Field Ornithol.* 60(Suppl. 1):469-494.
- Robertson, I. 1971. The influence of brood-size on reproductive success in two species of cormorant, *Phalacrocorax auritus* and *P. pelagicus*, and its relation to the problem of brood-size. Master's Thesis. Univ. of British Columbia, Vancouver.
- Van Der Veen, H. E. 1973. Some aspects of the breeding biology and demography of the Double-crested Cormorants (*Phalacrocorax auritus*) of Mandarte Island. Ph.D. thesis. Zoologisch Laboratorium der Rijksuniversiteit te Groningen, Groningen.

Weseloh, D.V. Chip, and P.J. Ewins. 1994. Characteristics of a rapidly increasing colony of double-crested cormorants (*Phalacrocorax auritus*) in Lake Ontario: population size, reproductive parameters and band recoveries. *J. Great Lakes Res.* 20(2): 443-456.

**Great shearwater (*Puffinus sp.*)**

- Ainley, D. G., T. C. Telfer, and M.H. Renyolds. 1997. Townsend's and Newell's Shearwater (*Puffinus auricularis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/297>.
- Brooke, M. 1990. The Manx Shearwater. T. and A. D. Poyser, London.
- Byrd, G. V., D. I. Moriarty, and B. G. Brady. 1983. Breeding biology of Wedge-tailed Shearwaters at Kilauea Point, Hawaii. *Condor* 85:292-296.
- Clucas, R. J., Fletcher, D. J., Moller, H. 2008. Estimates of adult survival rate for three colonies of Sooty Shearwater (*Puffinus griseus*) in New Zealand. *Emu*: 108:237-250.
- Cuthbert, R. J. 2005. Breeding biology, chick growth and provisioning of Great Shearwaters (*Puffinus gravis*) at Gough Island, South Atlantic Ocean. *Emu*: 105(4), 305-310. Accessed at: <http://www.publish.csiro.au/?paper=MU05036>
- Cramp, S. 1978. Ed. Handbook of the Birds of Europe, the Middle East and North Africa. Vol. 1: *Ostrich to Ducks*. Oxford University Press, Oxford.
- Cramp, S. 1985. Ed. Handbook of the Birds of Europe, the Middle East and North Africa. Vol. 4: *Terns to Woodpeckers*. Oxford University Press, Oxford.
- Cramp, S. and Simmons, K.E.L.. 1983. Eds. Handbook of the Birds of Europe, the Middle East and North Africa. Vol. 3: *Waders to Gulls*. Oxford University Press, Oxford.
- Floyd, R. B. and N. M. Swanson. 1983. Wedge-tailed Shearwaters on Muttonbird Island: an estimate of the breeding success and the breeding population. *Emu* 82:244-250.
- Furness, R. W. and P. Monaghan. 1987. Seabird Ecology. Blackie & Son Ltd, Glasgow and London.
- Gallagher, M. D. 1960. Bird notes from Christmas Island, Pacific Ocean. *Ibis* 102(4):489-502.
- Harris, M. P. 1966. Breeding biology of the Manx Shearwater *Puffinus puffinus*. *Ibis* 108:17-33.
- Hunter, C.M. and H. Caswell. 2005. Selective harvest of sooty shearwater chicks: effects on population dynamics and sustainability. *Journal of Animal Ecology* 74(4):589-600.
- Hunter, C. M., H. Moller, and D. Fletcher. 2000. Parameter uncertainty and elasticity analyses of a population model: setting research priorities for shearwaters. *Ecological Modeling* 134(2-3), 299-324.

- Lee, D. S. and J. C. Haney. 1996. Manx Shearwater (*Puffinus puffinus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/257>.
- Perrins, C. M., M. P. Harris, and C. K. Britton. 1973. Survival of Manx Shearwaters (*Puffinus puffinus*). *Ibis* 115:535-548.
- Perrins, C. M., M. P. Harris, and C. K. Britton. 2008. Survival of Manx Shearwaters *Puffinus puffinus*. *Ibis* 115(4), 535-548.
- Seto, N. W. 2001. Christmas Shearwater (*Puffinus nativitatis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/561>.
- Swift, K. Personal communication, as cited in Seto 2001.
- Whittow, G. C. 1997. Wedge-tailed Shearwater (*Puffinus pacificus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/305>.

**Pied-billed grebe** (various related species from Podicipedidae family )

- Arnold, T. W. 1990. Determinacy of clutch size in Horned and Pied-billed grebes. *Wilson Bull.* 102:336-338.
- Chabreck, R. H. 1963. Breeding habits of the Pied-billed Grebe in an impounded coastal marsh in Louisiana. *Auk* 80:447-452.
- Cottam, C. and W. C. Glazener. 1959. Late nesting of water birds in south Texas. *Trans. N. A. Wildl. Conf.* 24:382-395.
- Cramp, S. and K. E. L. Simmons. 1977. The birds of the Western Palearctic. Vol. 1. Oxford Univ. Press, Oxford, UK.
- Eichhorst, B. A. 1992. An analysis of Western Grebe banding and recovery data. *N. Amer. Bird Bander* 17:108-115.
- Fjelds , J. 1973. Territory and the regulation of population density and recruitment in the Horned Grebe *Podiceps auritus arcticus* Boje, 1822. *Vidensk. Meddr dansk naturh. Foren.* 136:117-189.
- Forbes, M. R. L., H. P. Barkhouse, and P. C. Smith. 1989. Nest-site selection by Pied-billed Grebes *Podilymbus podiceps*. *Ornis Scand.* 20:211-218.
- Glover, F. A. 1953. Nesting ecology of the Pied-billed Grebe in Northwestern Iowa. *Wilson Bull.* 65:32-39.
- Johnsgard, P. A. 1987. Diving Birds of North America: Species Accounts – Grebes (Podicipedidae). *Diving Birds of North America*, by Paul Johnsgard. Paper 10. <http://digitalcommons.unl.edu/bioscidivingbirds/10/>.

- LaPorte, N., Storer, R. W. and G. L. Nuechterlein. 2013. Western Grebe (*Aechmophorus occidentalis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/026a>.
- Lindvall, M. L. and J. B. Low. 1982. Nesting ecology and production of Western Grebes at Bear River Migratory Bird Refuge, Utah. *Condor* 84:66-70.
- MacVean, S. R. 1988. Artificial incubation, captive-rearing and maintenance of Pied-billed Grebes in Guatemala. Master's Thesis. Colorado State Univ., Fort Collins.
- MacVean, S. R. 1990. Breeding by first-year captive-reared Pied-billed Grebes. *J. Field Ornithol.* 61:156-158.
- Muller, M. J. 1995. Pied-billed Grebes nesting on Green Lake, Seattle, Washington. *Wash. Birds* 4:35-59.
- Muller, M. J. and R. W. Storer. 1999. Pied-billed Grebe (*Podilymbus podiceps*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/410>.
- Otto, J. E. 1983. Breeding ecology of the Pied-billed Grebe (*Podilymbus podiceps* [Linnaeus]) on Rush Lake, Winnebago County, Wisconsin. Master's Thesis. Univ. of Wisconsin, Oshkosh.
- Stedman, S. J. 2000. Horned Grebe (*Podilymbus auritus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/505>.
- Stout, B. E. and G. L. Nuechterlein. 1999. Red-necked Grebe (*Podiceps grisegena*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/465>.
- Wolf, K. 1955. Some effects of fluctuating and falling water levels on waterfowl production. *J. Wildl. Man.* 19:13-23.

**Sanderling** (*Calidris alba*)

- Boates, J. S. and R. McNeil. 1984. Longevity record for the Sanderling. *J. Field Ornithol.* 55:485.
- Cooper, J. M. and E. H. Miller. 1997. Populations, status, and biology of shorebirds breeding near Masset, Queen Charlotte Islands. Pages 123-129 in *The ecology, status, and conservation of marine and shoreline birds of the Queen Charlotte Islands*. (Vermeer, K. and K. H. Morgan, Eds.) Occasional Paper 93, Canadian Wildlife Service, Ottawa, Ontario.

- Evans, P. R. and M. W. Pienkowski. 1984. Population dynamics of shorebirds. Pages 83-123 in Behavior of marine animals. Vol. 5 (Burger, J. and B. L. Olla, Eds.) Plenum Press, New York.
- Jönsson, P. E. 1991. Reproduction and survival in a declining population of the southern Dunlin *Calidris alpina schinzii*. *Wader Study Group Bull.* 6(Supp):56-68.
- MacWhirter, B. P., Austin-Smith, P., and Kroodsma, D. 2002. Sanderling (*Calidris alba*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/653>.
- Meltofte, H. 1985. Populations and breeding schedules of waders, Charadrii, in high arctic Greenland. *Meddr. Grønland Biosci.* 16:1-43.
- Myers, J. P. 1980. Sanderlings (*Calidris alba*) at Bodega Bay: facts, inferences and shameless speculations. *Wader Study Group Bull.* 30:26-32.
- Nebel, Silke and John M. Cooper. 2008. Least Sandpiper (*Calidris minutilla*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/115>
- Norton, D. W. 1972. Incubation schedules of four species of calidridine sandpipers at Barrow, Alaska. *Condor* 74:164-176.
- Warnock, Nils D. and Robert E. Gill. 1996. Dunlin (*Calidris alpina*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/203>